

RESEARCH ARTICLE

EFFECT OF MINI-NUT TECHNIQUES ON THE GROWTH OF *Cola nitida* Conus (Kola) SEEDLINGS

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ABSTRACT

Cola nitida, also known as Kola nut is a tropical tree crop which belongs to the family sterculiaceae. The study investigated the effect of mini-nut technique on the growth of *Cola nitida*. Seeds were planted directly inside polythene pots containing different potting media. The growths of the plants were monitored properly for 12th weeks. The experiment were laid out in 4 x 4 factorial experiment (25%, 50%, 75%, 100% of *Cola nitida* each were planted in polythene pots contain four (4) different media which are (topsoil, coconut husk, saw dust, rich husk) making sixteen treatments altogether, these were laid out in Complete Randomize Design replicated two times. The parameters assessed were plant height, stem diameter and leaf production. The results were analyzed using analysis of variance (ANOVA). The result showed that there were no significant differences among the treatment at 5% level of significance. But the mean results showed that the 100% of nut planted inside the top soil (T₄) and 75% of nut (T₁₁) planted inside the saw dust produced highest mean value of (9.40cm) and (8.60cm) in plant height, while 100% of nut planted inside the rice husk (T₁₆) had the highest mean value of (0.50cm) in plant diameter; also under leaf production 25% of nut planted inside the rice husk (T₁₃) had the highest leaf production of (2.50). Based on the results of this experiment, mini-nut technique in the propagation of kola nut seeds can be recommended for farmers in any of the potting media mentioned above since there is no significant difference across the media. It was observed that the propagation of *Cola nitida* from mini-nut techniques was a success, even though there were no significant differences across the factors

KEYWORDS: *Cola nitida*, Kola nut, Growth, Seedlings, Husk

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INTRODUCTION

Cola nitida, also known as Kola nut is a tropical tree crop which belongs to the family sterculiaceae. It is native to regions of West Africa (Keay, 1990). This crop is economically important because it is used by natives for ceremonies and chewed as a masticant and stimulant. The nut is also source of caffeine which is used in pharmacological industries (Burdock *et al.*, 2009). There are over 40 cola species out of which *Cola nitida* and *Cola acuminata* are of major economic and social importance in Nigeria. Two types of kola are common in Africa, *Cola nitida* and *Cola acuminata*. In Nigeria, fresh and cured kola nut chewing are prominent as a masticant. Nuts are not produced by tree until it is about seven years old. Peak production does not start until the tree reaches 15years of age. The nuts are generally produced between November and December for *Cola nitida* (Adebayo, 1989).

Kola nut is a caffeine-containing nut of evergreen trees of the genus. Kola primarily, the species *Cola acuminata* and *Cola nitida* (Olunloyo, 1979). *Cola nitida* has a long history of cultivation and trade in West Africa, especially in Nigeria, Ivory Coast, Sierra Leone, Guinea, Liberia, Ghana, Togo and Cameroon. *C. nitida* is believed to have its centre of origin and diversity in the forested area of Ivory Coast and Ghana. Kola nuts were widely used in west and central Africa long before the influx of the Europeans. Leo Africanus referred to a bitter nut with the name 'goro' which he encountered during a visit to western Sudan in 1556. This is the name that is used to refer to *Cola nitida* in Nigeria. In the 1800s, a pharmacist in Georgia took extracts of kola and cocoa and mixed them with sugar, other ingredients and carbonated water to invent the first cola soft drink. He tasted it and called it "coca-cola". Cocaine (not the other extracts from the peruvina coca leaf) was prohibited from soft drinks in the U.S after 1940 and coca-cola no longer uses neither kola nor cocaine in its original recipe (Burdock *et al.*, 2009).

Presently the demand for kola nut is far in excess of its production as ably predicted by (Egbe and Oladokun, 1987). Thus there is a need to increase its productivity (Oladokun, 1985). Kola seeds had been found to begin germination 90days (Oladokun, 1985). According to (Oladokun, 1985) kola seeds begin germination at 2-4 weeks after sowing when adequate watering is carried out daily. Seeds are planted in the seedling bag under 50% shady environment. Kola nut weighting 15g and above should be selected for raising seedlings (Oguntuga, 1975).

Despite the economic importance of *Cola nitida*, very few works have been done on early growth of cola by mini-nut technique on different potting media. There is therefore the need to carry out this study to find a way of increasing the production of *Cola nitida*.

METHODOLOGY

Study Site: The experiment was carried out at Forest Development Unit of the Federal College of Forestry, Ibadan. It lies between latitude 7°23'N and longitude 3°51'E. The climate condition of the area is tropical dominated by rainfall pattern of 1400mm-1750mm. The average humidity is

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of about 80-85%. Dry season is from November to March and rainy season is from April to October (FRIN, 2012).

Description of Kola nuts

Harvested nuts were obtained from the mother tree at Ile-Ife; polythene pots were used as a germinator and kola nuts weighting 17g and above were planted. Saw dust, Rice husks, Coconut husks and top soil were used as the growing media. The growing media had undergone watering for about three days before planting, to allow moisture in the media and to enhance fast growth of the species.

METHODS

Each seed was planted into 22cm length and 10.6cm breadth capacity pots with each being filled with potting media. The media were made from top soil, rice husks, and coconut husks and saw dust. The top soil and a whole nut served as the control. The seeds were planted three days after watering.

Treatments

Two (2) factors experiment

Factor 1: Potting media

Top soil
Cocoa nut husks
Saw dust
Rice husks

Factor 2: Nut/cotyledon reduction at 4 levels

25% Nut/cotyledon reduction
50% Nut/cotyledon reduction
75% Nut/cotyledon reduction

Whole Nut scarified

After preparing the treatments, nuts were sown horizontally on their sides into the medium (saw dust, rice husk, coconut husk, topsoil) to a depth of about 4-5cm.

Experimental Design

The experiment was 4 x 4 factorial experiment i.e. 16 treatment with 2 (two) replicate.

M₁ = Top soil

M₂ = Coconut husk

M₃ = Sawdust

M₄ = Rice husk

P₁ = 25% nut

P₂ = 50% nut

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P₃ = 75%

P₄ = whole nut scarified

KEYS:

M = Media (potting media)

P = Percentage of the nut

M₁P₁ = T₁

Data Collection

The data collection commenced a week after seed germination and continued weekly. The following parameters were measured: Plant height (cm), number of leaves, stem diameter (cm). The data was collected for twelve weeks.

Data Analysis

All data collected were subjected to analysis of variance (ANOVA) and the means were separated using Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Table 1: Mean and Duncan Multiple Range Test for the Effect of Mini-nut Technique on the Growth of *Cola nitida*

| Treatments | Height (cm) | Stem Girth (cm) | Leaf Production |
|-----------------|-------------|-----------------|-----------------|
| T ₁ | 2.65 | 0.17 | 1.00 |
| T ₂ | 5.60 | 0.44 | 1.50 |
| T ₃ | 1.65 | 0.16 | 0.00 |
| T ₄ | 9.40 | 0.47 | 1.00 |
| T ₅ | 2.60 | 0.16 | 0.00 |
| T ₆ | 2.80 | 0.37 | 0.00 |
| T ₇ | 0.80 | 0.15 | 0.00 |
| T ₈ | 3.55 | 0.31 | 0.00 |
| T ₉ | 0.00 | 0.00 | 0.00 |
| T ₁₀ | 3.55 | 0.20 | 0.00 |
| T ₁₁ | 8.60 | 0.26 | 1.50 |
| T ₁₂ | 2.50 | 0.17 | 0.00 |
| T ₁₃ | 7.50 | 0.43 | 2.50 |
| T ₁₄ | 3.65 | 0.24 | 0.00 |
| T ₁₅ | 0.00 | 0.00 | 0.00 |
| T ₁₆ | 7.05 | 0.50 | 0.00 |
| | Ns | Ns | Ns |
| LSD | 9.00080 | 0.48145 | 1.94734 |
| Grand Mean | 3.86875 | 0.25438 | 0.46875 |
| %CV | 109.74 | 89.28 | 195.96 |

No significant difference at 5% level of significance

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Plant Height

Table 1 showed that among the seedling raised with top soil (T₄) which is 100% Nut produced the highest mean value of (9.40cm) followed by seedling raised from Sawdust (T₁₁) which is 75% Nut with (8.60), from rice husk (T₁₃) which is 25% Nut with (7.50cm) while seedling raised from sawdust (T₁) which is 25% and seedling raised from rice husk (T₁₅) which is 25% Nut was the least with (0.00cm).

Stem Girth

Table 1 also showed that seedling raised from rice husk (T₁₆) which is 100% Nut had the highest mean value of (0.50cm), followed by seedling raised from top soil (T₄) which is 100% Nut with (0.47cm), seedling raised from top soil (T₂) reduced by 50% Nut with (0.44cm) while seedling raised from sawdust and rice husk (T₉ and T₁₅) reduced by 25% and 75% was the least with (0.00).

Leaf Production

Table 1 revealed that leaf production of *Cola nitida* seedlings indicated that (T₁₃) from rice husk had the highest number of leaves with the mean value of (2.50) in all

CONCLUSION

It was observed that the propagation of *Cola nitida* from mini-nut techniques was a success, even though no significant difference across the factors but it was noticed that there was first emergence of shoot and leave from the rice husk (T₁₃) which is 25% Nut while the one that yielded most in height out of all the treatments is the 100% Nut (T₄) from top soil and 75% Nut from sawdust.

APPENDIX

Table 2: Result of Chemical Analysis for Top Soil

| Parameters | Value |
|----------------------------|-------|
| pH | 5.87 |
| Sand (gkg ⁻¹) | 884 |
| Slit (gkg ⁻¹) | 52 |
| Clay (gkg ⁻¹) | 64 |
| Na (cmol/kg) | 0.54 |
| K (cmol/kg) | 0.23 |
| Ca (cmol/kg) | 3.98 |
| Mg (cmol/kg) | 0.21 |
| Ex. Acidity H ⁺ | 0.12 |
| C.E.C | 5.08 |
| Av.P (mg/kg) | 1.64 |
| % Org. Carbon | 2.46 |
| % Org. Matter | 4.24 |
| % N | 0.25 |

Source: Institute of Agriculture Research and Technology (IAR & T) soil lab.



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Table 3: Chemical Analysis of the Organic Material Used

| Parameters | Rice husk | Saw dust | Coconut husk |
|----------------|-----------|----------|--------------|
| pH | 6.11 | 6.50 | 6.09 |
| Na (cmol/kg) | 2.09 | 2.50 | 9.04 |
| K (cmol/kg) | 1.02 | 1.38 | 8.08 |
| Ca (cmol/kg) | 0.88 | 3.32 | 2.36 |
| Mg (cmol/kg) | 3.78 | 0.84 | 0.15 |
| H ⁺ | 0.10 | 0.09 | 0.11 |
| C.E.C | 7.87 | 8.13 | 19.34 |
| Av.P (mg/kg) | 99.34 | 37.38 | 40.23 |
| % N | 0.43 | 0.37 | 0.15 |
| % Org. Carbon | 4.32 | 37.44 | 14.80 |

Source: Institute of Agriculture Research and Technology (IAR & T) soil lab. 2014

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